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13. ABSTRACT *(Maximum 200 Words)*

This grant made possible technical advances at the University of Pennsylvania site of the AFOSR PRET Center, substantially improving this site's capability to study the neurobehavioral and neurobiological deficits associated with sleep deprivation, excessive work demands, stressors, night shift activities, jet lag, and the development of countermeasures in the context of simulated sustained operations. The instrumentation purchased has markedly enhanced our laboratory's ability to track in a discrete temporal range (from milliseconds to minutes) human performance errors in stressful situations relative to behavior (time-locking video), physiology (cardiovascular [ECG] and EEG), and stress hormones (glucocorticoids, catecholamines). This equipment has been integrated into the AFOSR PRET Center research we are currently completing, examining human performance capability in relation to 88 hr simulated SUSOPS, and the effectiveness of napping and modafinil administration as potential countermeasures.

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Instrumentation to Track Performance Relative to Behavior, Physiology and Blood Chemistry Final Report
University of Pennsylvania
Principal Investigator: David F. Dinges. Ph.D.

Summary Report:

The equipment requested in the proposal was purchased and incorporated into the basic scientific research at the University of Pennsylvania site of the AFOSR PRET Center. This research involves assessment of potential countermeasures to overcome the neurobehavioral and neurobiological deficits associated with sleep deprivation, excessive work demands, stressors, night shift activities, and jet lag.

Specifically, the Mallinckrodt "Sandman" Systems purchased provide on-line, real-time and stop-action (manual search) evaluation of EEG, EOG, and ECG signals relative to integrated high-resolution video of the performer. Such information permits us to analyze second-to-second changes in behavior (e.g., distractibility) relative to neurobiology and neurobehavioral performance. In addition, we have recently integrated one of our primary neurobehavioral assessment tools (Psychomotor Vigilance Task-PVT) with the Sandman System, further allowing for simultaneous assessment of neurobehavioral functioning and brain activity (EEG).

Further, the Sandman System contains state-of-the-art power spectral analyses (FFT) software for signal processing of EEG, EOG, and ECG relative to neurobehavioral performance and behavior.

Major Purchases under this agreement:

6 - Sandman Systems
6 - Dell Flat Screen Monitors